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INSECTS IN RELATION
TO
NATIONAL DEFENSE

Circular 2 Supplement A

TERMITES



June 1941

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To meet a need indicated in contacts with defense housing agencies for a concise statement, for use by architects and contractors, of minimum requirements for preventing damage by termites in new construction, the following brief has been prepared as a supplement to Circular No. 2 of the series entitled "Insects in Relation to National Defense". It is not intended that this supplement should be used without regard to the more complete information given in the original circular. The problem of termite control cannot be so simplified that effective results can be obtained without a knowledge and appreciation of the habits of the insects. Very careful planning and supervision of all construction work is absolutely necessary if the desired protection is to be obtained. Carelessness in carrying out any of these minimum requirements may result in buildings that will later become infested by termites. Control of such infestations is often a very expensive procedure. The need for such expenditures can be avoided by careful observance of the recommendations made in Circular 2 and this supplement.

ESSENTIAL PROCEDURES FOR PREVENTING
TERMITE DAMAGE IN NEW CONSTRUCTION

Termites^{1/} are responsible for extensive damage to buildings in this country, yet most of this damage is needless and can be prevented by relatively simple practices.

Subterranean termites^{2/} live in the soil where they can obtain ample moisture, which is essential to their life. They cannot live without moisture. They can damage the dry woodwork of a building only if that woodwork is so located that they can go back and forth between it and their galleries in the ground.

Termites feed on wood and can establish colonies only where there is wood in or on the ground, but after a colony is once established they can obtain additional food from the framework of a building if they can reach it through underground passages, through cracks or joints in the foundation, or through earth-like shelter tubes that they may construct over the surface of any building material.

1/ The information here given deals only with the termites that live in the ground. Certain other species, known as dry-wood termites, live and make their nests in dry wood without maintaining contact with the ground. These species are of importance in the United States only in a narrow strip along the coast from Virginia to Texas and across to southern California but are very common in many tropical regions. The damage by these forms is relatively slight in comparison with that caused by subterranean species.

2/ Subterranean termites occur in every state in the Union (Fig. 9). They are most destructive in the areas of heavy rainfall and high humidity along the Atlantic coast and in the Ohio and Mississippi River valleys and southern California.

Any kind of wood left in, or in contact with, the ground furnishes termites an opportunity to establish a colony. Attacks on buildings therefore can be prevented by eliminating conditions favorable for the development of a colony or by properly insulating the buildings from the ground by impervious foundations so that termites from a colony under or near a building cannot reach the woodwork above except in a manner readily detected by inspection.

Experience has shown that certain practices common in the design and construction of buildings are conducive to infestation by termites. It also has shown that simple modification of these practices will assure protection against termites (and decay) without violating principles desirable from the standpoint of the architect and builder. Points where hidden attack may occur should receive special attention. The following recommendations, if carefully followed, will result in practically complete protection:

- (1) Remove all wood debris (stumps, logs, etc.) from the building site before construction is begun and prevent the burial or leaving of any form boards, stakes, scraps of lumber, or other cellulose materials during construction and grading operations.
- (2) Do not permit any contact between the woodwork of a building and the ground. All wood used in basements, such as stair carriages, door frames, partitions, or posts, should rest on poured concrete plinths, pedestals or curbs that extend above the general floor level.
- (3) Clearance under buildings without basements should be a minimum of 18 inches below the bottom of all wood substructures, to allow crawl space for making inspections. Access doors or openings must be provided. On the outside of all buildings with foundations of poured concrete or of unit masonry

capped with reinforced poured concrete, the grade line should be at least 6 inches below all siding, sheathing or wood'trim, or 6 inches below the top of the foundation where the superstructure is of brick veneer or other types of masonry. If a unit type foundation is capped with solid concrete blocks the outside grade should be kept at least 4 inches below the uppermost horizontal joint so as to prevent direct entry by termites from the soil to cracks in the vertical joints between blocks.

(4) Provide adequate cross ventilation beneath all wood construction over the ground so that no dead air pockets will exist, and allow at least 2 square feet of net opening for each 25 lineal feet of wall, or an amount equal to 1 1/2 percent of the floor area.

(5) Good drainage is essential to keep the soil under the building as dry as possible.

(6) Isolate porches, steps, and terraces from the foundation and woodwork by metal aprons constructed so as also to act as moisture flashings. The vast majority of all termite infestations originate at such entrance platforms. Where low-cost construction will not permit the installation of metal aprons, isolating entrance platforms from the house proper by a space of 2 to 3 inches will afford considerable protection, provided debris is not allowed to accumulate in this space. This suggestion is particularly applicable where step platforms are supported on posts or piers and the spaces below the platforms are left open.

(7) Floor sleepers, furring strips or other wood embedded in, or laid on masonry or concrete which is in direct contact with the ground should be impregnated with an approved preservative by a standard pressure process in order to insure protection from decay and from termites that may reach

the wood through cracks in the concrete or masonry. Timbers should be completely framed before treatment whenever possible, but when cutting after treatment is unavoidable, the cut surfaces should be given two coats of a suitable preservative.

(8) Expansion joints in floors and spaces around pipes penetrating floors and walls should be sealed with coal-tar pitch, coal-tar plastic cement, or crimped metal connectors.

(9) All foundations should be made impervious to termites. Cracks that are 1/32 inch or more in width will permit the passage of termites and should be prevented insofar as possible. Poured concrete foundations properly reinforced to prevent large cracks due to shrinkage or unusual stress will give the greatest protection against hidden attack. Masonry walls or piers capped with a minimum of 4 inches of reinforced concrete, poured in one continuous operation, will also be effective in preventing hidden entrance. Capping with precast solid concrete blocks or brick, with all joints completely filled with cement mortar or poured lean grout, or filling with concrete the top course of a hollow block foundation, is better than the use of hollow units without such capping. However, this type of capping should be used only as a last resort, and only where constant, rigid supervision can be given to the work. Shrinkage or settlement cracks are almost certain to form in the cells or the vertical joints between blocks or bricks and thus allow direct hidden attacks by termites which cannot be seen upon later inspections. A further objection is the fact that it is impossible to detect poor workmanship after the floor framing is in place.

(10) Metal shields over foundations give added protection but only when properly installed.

In our experience relatively few installations are adequate because of faulty joints, openings around anchor bolts, and improperly cut and soldered corners. Furthermore, there is a tendency to use the shields only on the portions of the foundation where it is easy to install them and no protection is provided at other points, such as at porches, where installation is more difficult and where termites are most likely to attempt to gain entrance.

(11) Inspections should be made twice the first year after construction and once each year thereafter. If termite infestation is found, the necessary control steps should be applied while it is still localized. For more detailed information, write to the Bureau of Entomology and Plant Quarantine, United States Department of Agriculture.

The following diagrams illustrate many of these protective measures:

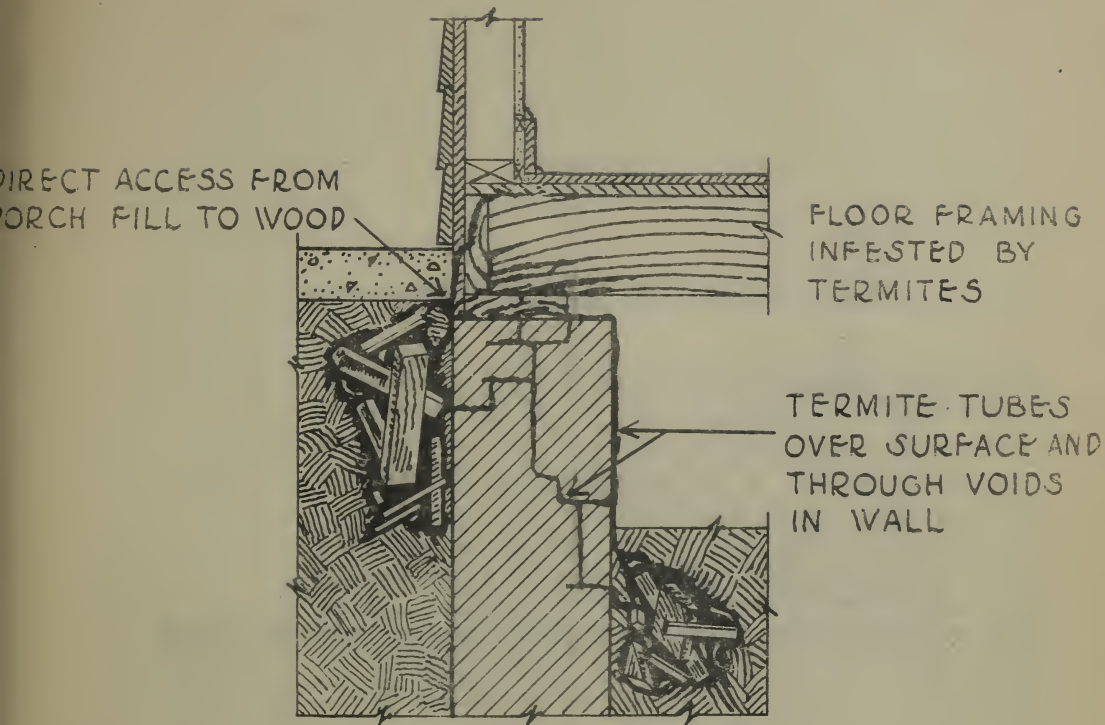


FIGURE 1. MIXING WOOD WITH THE SOIL about the foundation is one of the surest methods of inviting termites into a building. Wood debris in the soil, even in very small quantities, enables termites to develop colonies which may later infest the building. This figure illustrates how an infestation originating in such debris may spread through hidden points of access from porch fill or up through voids or cracks in a unit type wall. Also, how concentration of termite colonies under such conditions may stimulate or encourage the construction of shelter tubes over the surface of a wall in enclosed or partially excavated areas.

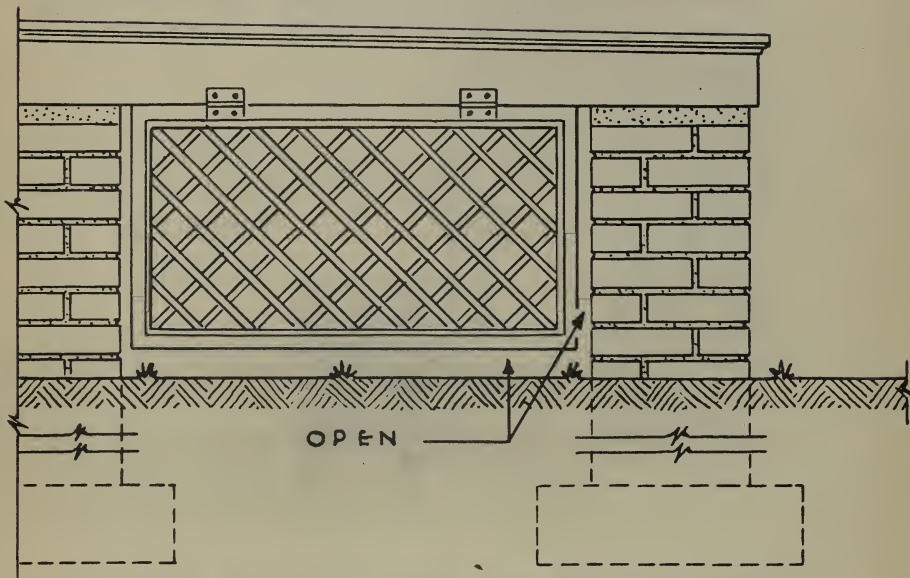


FIGURE 2. AMPLE VENTILATION reduces moisture essential to termite life and wood decay. This method of attaching lattice or skirting prevents termite damage and decay. Note minimum clearance of 1 inch at sides and 2 inches at bottom of lattice; also concrete cap over bricks to prevent hidden infestation by termites through cracks in joints between bricks.

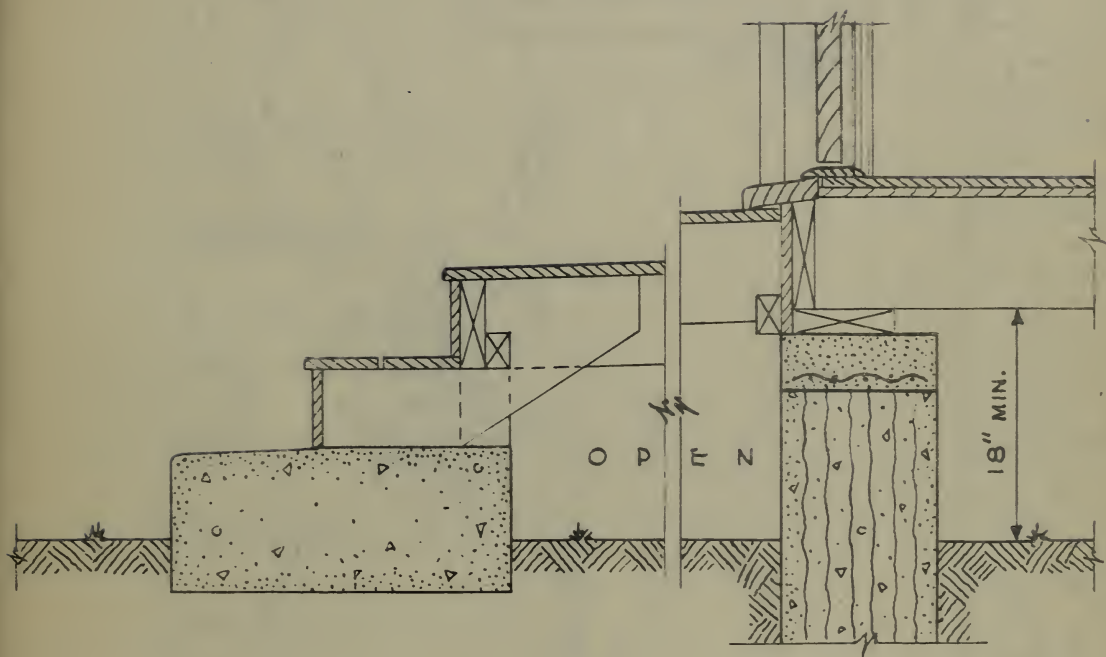


FIGURE 3. WOODEN STEPS OR PORCH protected from hidden infestation by resting carriage on a poured concrete base which forms the lower step. Platform attached to building above the poured concrete cap on foundation wall or pier.

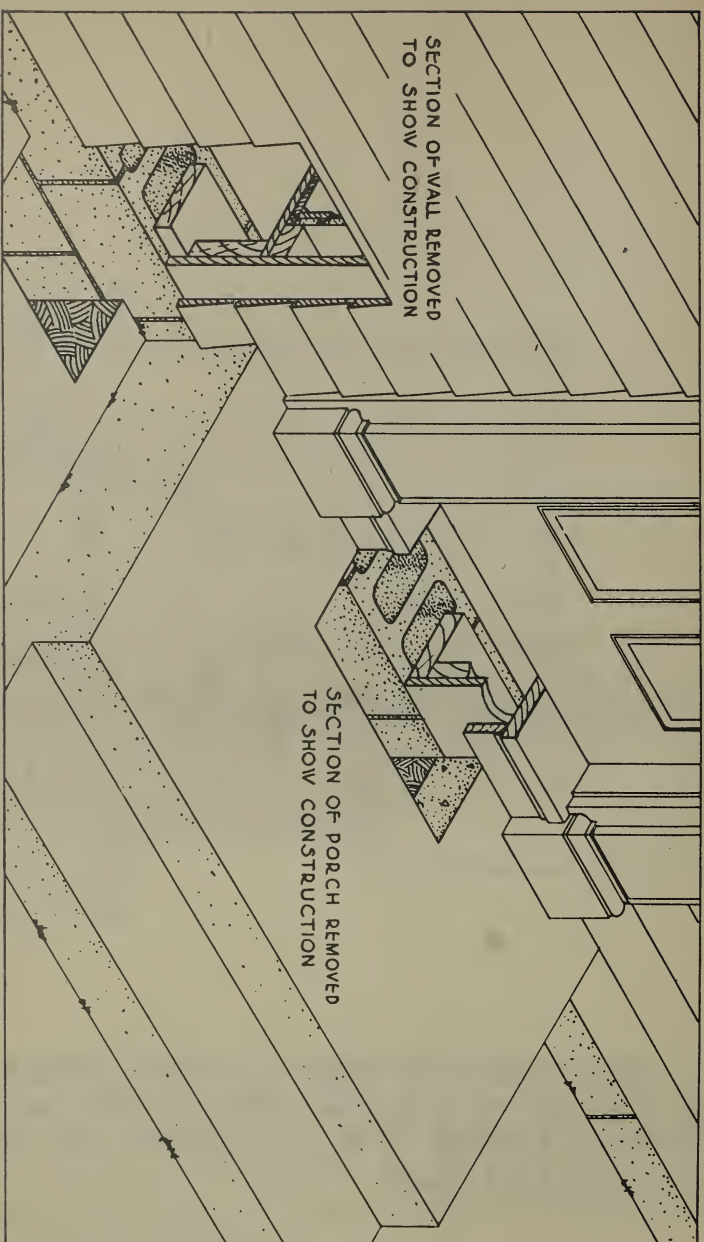


FIGURE 4. ABSENCE OF SPECIAL PROTECTION AT PORCHES, STEPS, AND TERRACES is responsible for the great majority of termite infestations. Termites may gain access to the woodwork of a building directly from the fill material or soil beneath such entrance platforms and through voids and settlement or shrinkage cracks in a masonry wall. (See figure 5 for preventive measures).

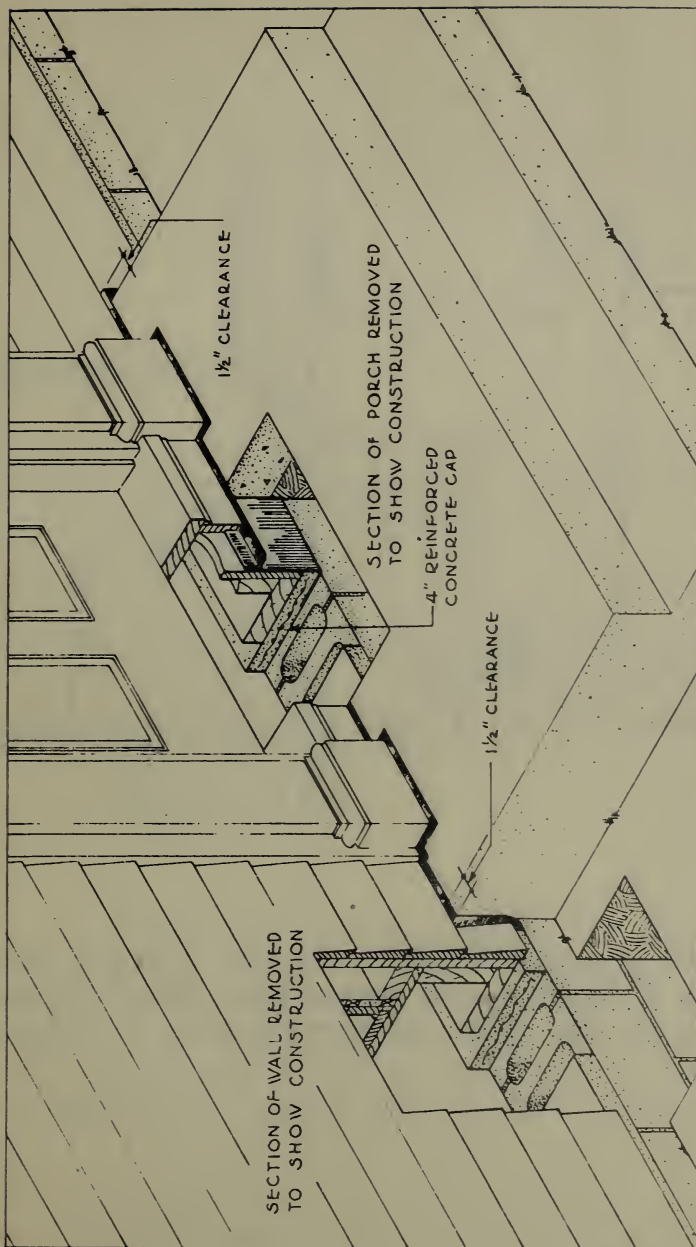


FIGURE 5. SPECIAL PROTECTION AT PORCHES, STEPS, AND TERRACES against hidden attack by use of metal apron to isolate the entrance platform and soil or fill from the building. Note the projection of the apron at the top and ends of the porch slab. This is essential. (See figure 6 for further details). The reinforced poured concrete cap on the masonry foundation wall prevents hidden access through the wall back of the apron or beyond the porch.

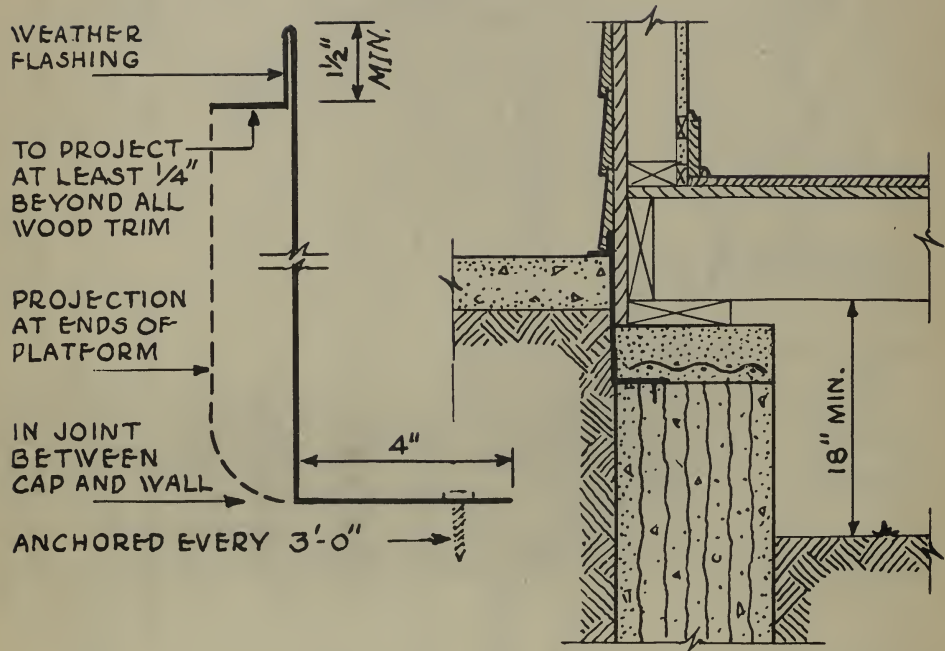


FIGURE 6. METAL APRON inserted between concrete slab and woodwork, anchored to unit type foundation and capped with reinforced concrete. The apron serves as a weather flashing as well as a termite barrier.

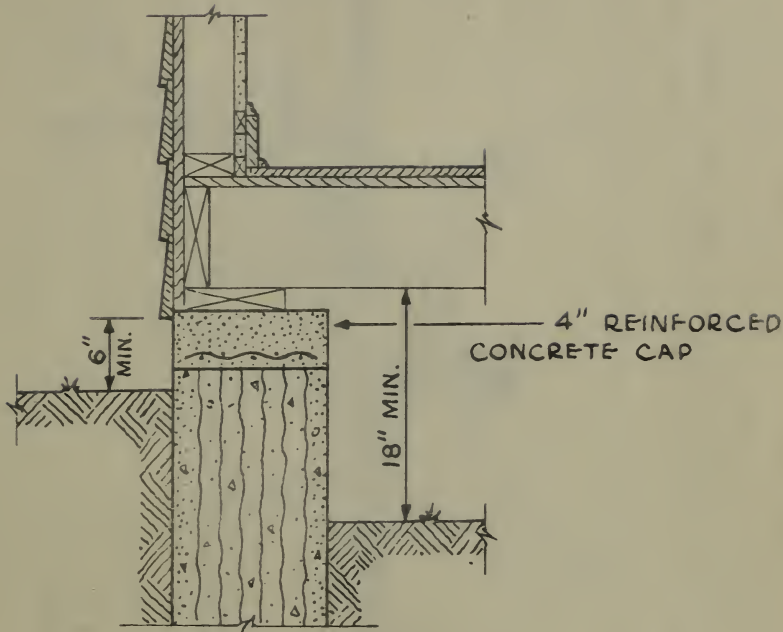


FIGURE 7. A REINFORCED POURED CONCRETE CAP on masonry walls or piers will prevent hidden attack by termites. This cap should be at least 4 inches thick and must be poured in one continuous operation so as to avoid joints. Minimum clearance of 18 inches under the building and 6 inches outside will allow inspection for the presence of termite tubes or for possible cracking of the cap.

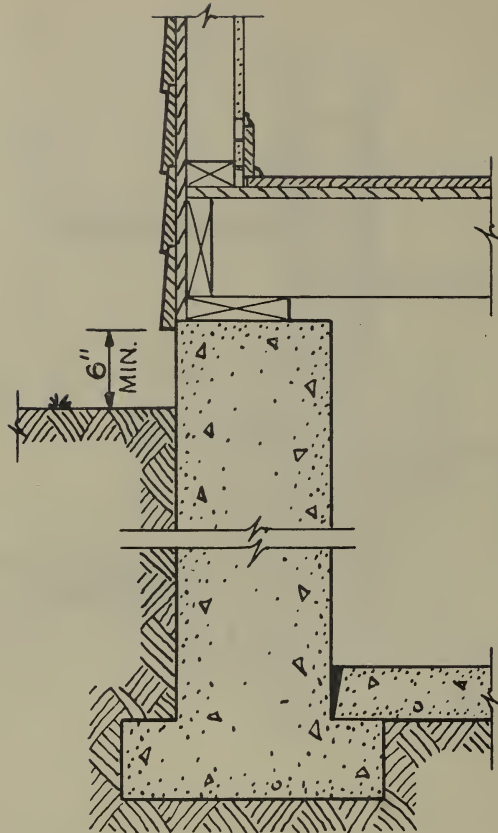


FIGURE 8. POURED CONCRETE FOUNDATION WALLS OR PIERS that are easily inspected offer complete protection against hidden termite infestation. All form boards and wood debris must be removed from the soil. Expansion joints should be filled with coal-tar pitch.

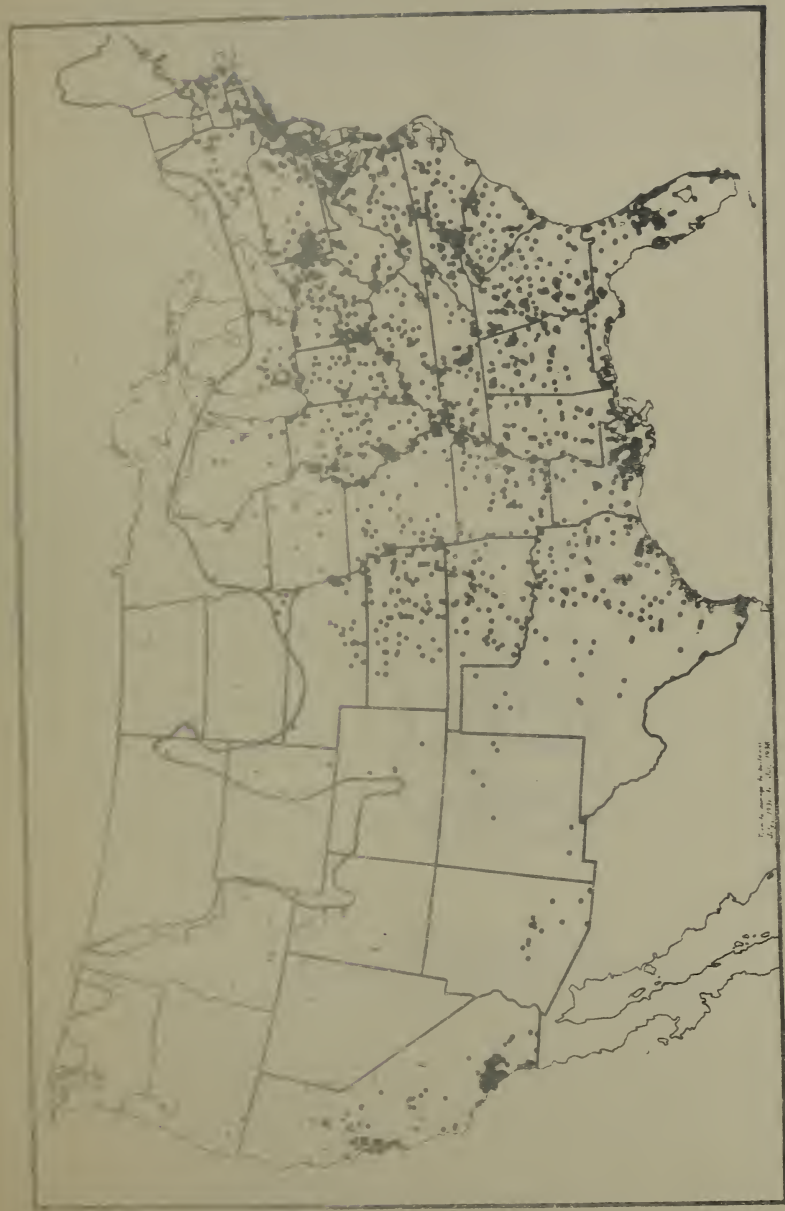


FIGURE 9. SUBTERRANEAN TERMITES are known to occur practically throughout the tropical and temperate parts of the world. They are common in most of the eastern half of the United States and along the Pacific coast but are most abundant from Massachusetts south along the Atlantic coast and the Gulf of Mexico, in the Ohio and southern part of the Mississippi River valleys and in southern California. This map shows the distribution of reports of termite infestations as received by the Bureau of Entomology and Plant Quarantine during the period July 1931 to July 1936.

